



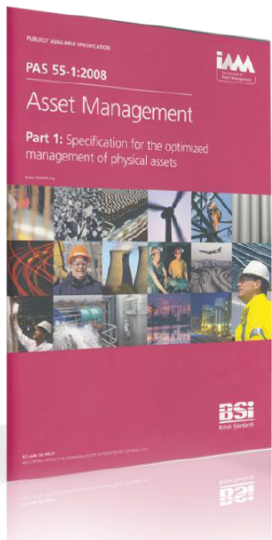
The Future of Asset Management

ISO 55000 Series Standard

By: Kevan J Slater

Brief History

In 2004 a **Publicly Available Specification (PAS)** was **first published by the British Standard Institution (BSi)** in response to demand from industry for a standard for the management of physical assets. (*Asset Management*)



Part 1: **Specification** for the optimized **management** of **physical assets**

Part 2: **Guidelines** for the **application** of PAS 55-1

Goals:

- ▶ Ensure consistency with other related management systems
- ▶ Facilitate its alignment or integration

In 2008 PAS 55-1 & 2 superseded the original 2004 standards

Asset Management

Definition:

Asset Management is the management of (primarily) “**physical assets**” (their **selection, maintenance, inspection and renewal**) for **operational performance** and **profitability** of industries that operate assets as part of their **core business**.

GOAL : Achieve **best net, sustained value-for-money** in the **selection, design/ acquisition, operations, maintenance and renewal/ disposal** of physical infrastructure and equipment.

Other Types of Assets Considered

Human Assets: the behaviours, knowledge and competence of the workforce.

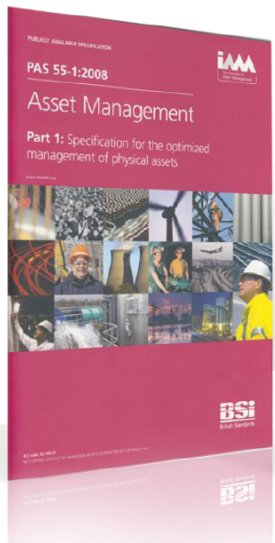
Financial Assets: resources required for infrastructure investments, operation, maintenance and materials;

Information Assets: good quality data and information to develop, optimize and implement asset management plan(s);

Intangible Assets: the organization's reputation and image can have a significant impact on infrastructure investment, operating strategies and associated costs.

What is ISO 55000?

The International Standards Organization (ISO) has accepted PAS 55 for the development of the new ISO series of international standards for asset management.



- **ISO 55000** provides an **overview** of the subject of asset management and the standard **principles** and **terminology** to be used.
- **ISO 55001** is the **requirements** specification for an integrated, effective management system for assets.
- **ISO 55002** provides **guidelines** for the application of such a system.

The development of these standards is ongoing, through ISO Committee PC251, with 31 countries participating. The standards are now finalized and approved, and voting has been completed with an expected publication date of February 15, 2014.

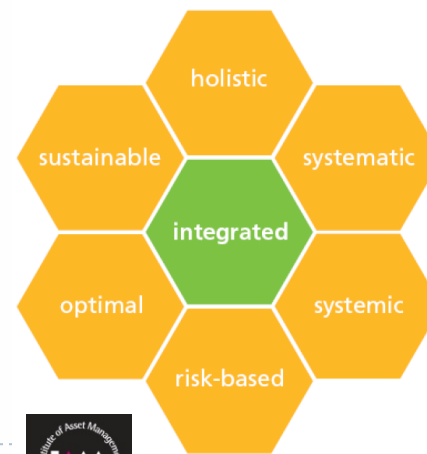
Principles of Asset Management

Holistic: looking at **the whole picture**, managing all aspects including the combination of **different asset types**;

Systematic: a **methodical** approach, promoting **consistent, repeatable** and **audit-able decisions and actions**;

Systemic: **optimizing** the **asset systems** value (including **sustainable performance, cost and risks**) rather than optimizing individual assets in isolation;

Risk-based: focussing resources and expenditure, and **setting priorities**, appropriate to the **identified risks** and the **associated cost/benefits**;

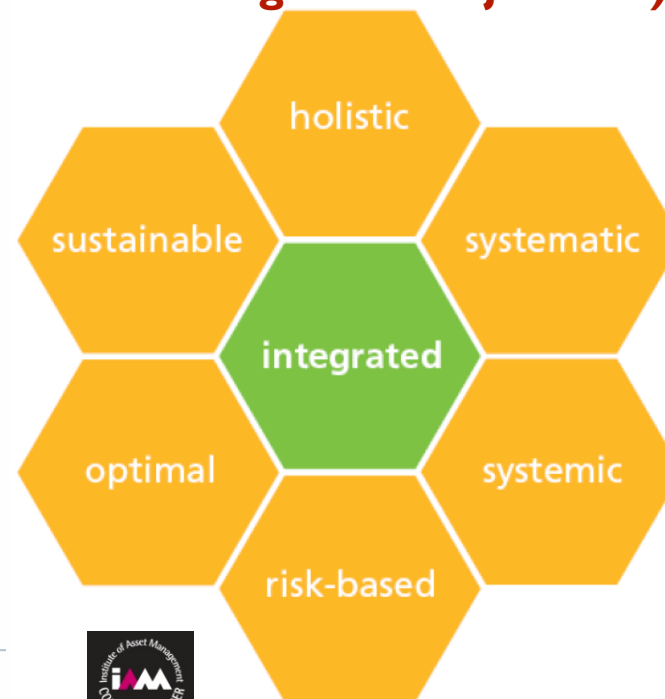


Principles of Asset Management

Optimal: establishing the **best value** between **performance, cost and risk**, associated with the **assets** over their **life cycles**;

Sustainable: considering the **long-term consequences of short-term activities** to ensure that adequate provision is made for future requirements and obligations (such as **economic or environmental sustainability, system performance, social responsibility and other long-term objectives**);

Integrated: **recognizing** that **interdependencies** and combined **effects** are **vital to success**.



Asset Management Essential Enabling Elements

- ▶ An organizational structure that **facilitates** the **implementation** of the asset management **principles** with a **clear direction and leadership**.
- ▶ Staff **awareness, competency, commitment** and **cross-functional coordination** to execute the program.
- ▶ **Adequate information and knowledge** available of **asset condition, performance, risks and costs** and the interrelationships between these.



Important Enabling Elements

Have a significant influence on the effectiveness and efficiency of an asset management system

- ▶ structure, authority and responsibility;
- ▶ outsourcing of asset management activities;
- ▶ training, awareness and competence;
- ▶ communication, participation and consultation;
- ▶ asset management system documentation;
- ▶ information management system;
- ▶ risk management;
- ▶ legal and other requirements;
- ▶ management of change (*lubricants ?*)

Levels of Asset Integration and Management

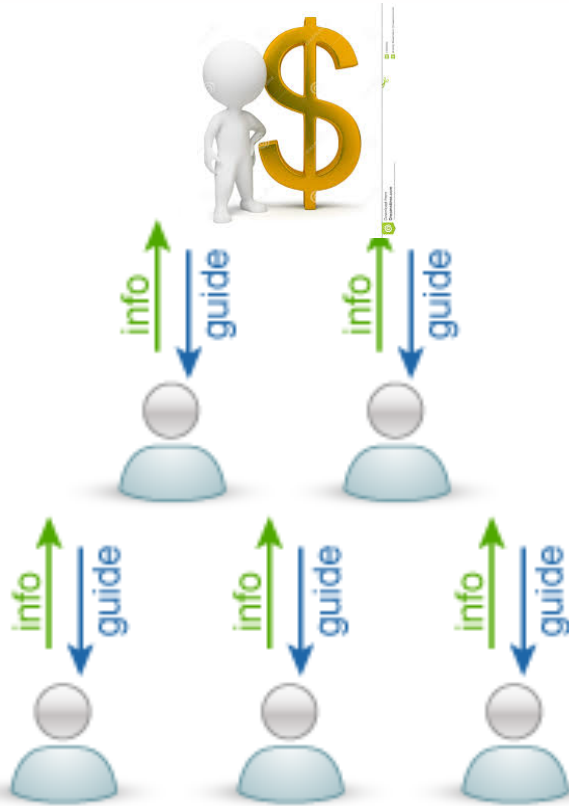
Typical priorities and concerns



Asset Management Purpose

Organizational strategic goals

Primarily designed to support the delivery of an organized strategic plan.



The strategic plan is the starting point for the development of the asset management policy, strategy, objectives and plans.

Top-down Driven

Optimal Life Cycle Activities

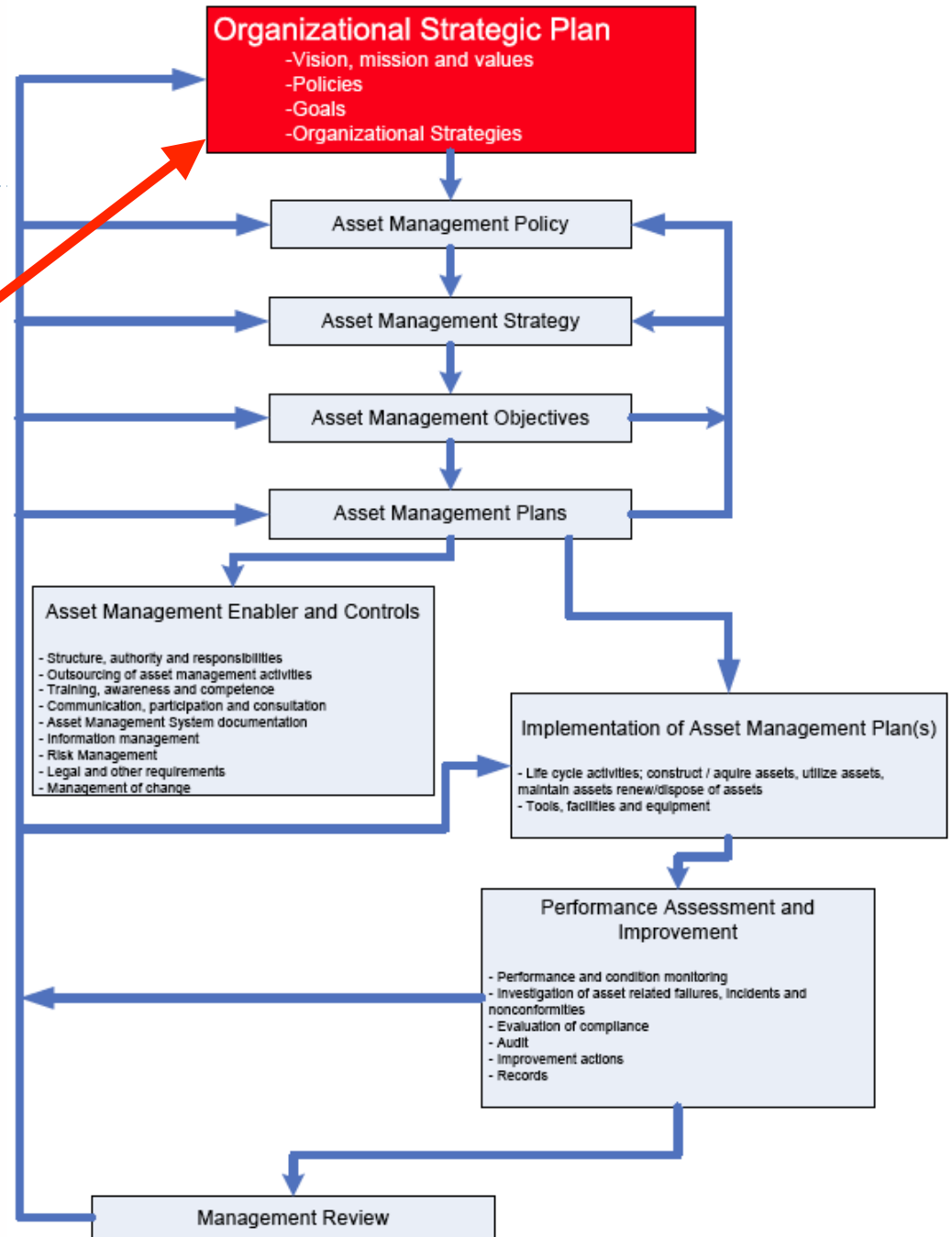
Life cycle activities or management of the assets must be applied across the assets and asset systems **based on criticality, condition and performance.**

*Requirement of a **top-down** connective thread to provide a **clear alignment** and “**line of sight**” between their **overall business objectives** right down to the **individual day-to-day** activities to **attain the mission and goals** of the organization.*



Typical Element Structure

Stakeholder expectations,
Internal and external
business drivers
(customers, shareholders,
regulators, employees,
suppliers, society)



Organization and Strategic Plan

The presence of an **asset management vision**, **policy**, and **strategy**, that is **aligned** with the **business plan** is **published**, **understood** and **shared** to **all levels** within the **organization**. It contains a visible bond to a committed leadership by providing an **effective organizational structure** representing the expected values, **ownership** and **accountability** commitments required for the **business** and **organizational objectives**.

Correspondence Between Standards

PAS 55:2008	OHSAS 18001:2007	PAS 55:2008	OHSAS 18001:2007	ISO 14001:2004	ISO 9001:2000
0 Introduction	0 Introduction	4.4.6 Information management	4.4.5 Control of documents	4.4.5 Control of documents	4.2.3 Control of documents
1 Scope	1 Scope	4.4.7 Risk management	4.3.1 Hazard identification, risk assessment and determining controls	4.3.1 Environmental aspects	-
2 Normative references	2 Normative r	4.4.7.1 Risk management process(es)			
3 Terms and definitions	3 Terms and c	4.4.7.2 Risk management methodology			
4 Asset management system requirements (title only)	4 OH&S man elements (4.4.7.3 Risk identification and assessment			
4.1 General requirements	4.1 General	4.4.7.4 Use and maintenance of asset risk information			
4.2 Asset management policy	4.2 OH&S p	4.4.8 Legal and other requirements	4.3.2 Legal and other requirements	4.3.2 Legal and other requirements	5.2 Custom...
4.3 Asset management strategy, objectives and plans (title only)	4.3 Plann	4.4.9 Management of change	4.3.1 Hazard identification risk assessme...		
4.3.1 Asset management strategy	-				
4.3.2 Asset management objectives					
4.3.3 Asset manage...					
4.3.4 Contingency plannir					
4.4 Asset management ena and controls					
4.4.1 Structure, authority and responsibilities					
4.4.2 Outsourcing of asset management activities					
4.4.3 Training, awareness and competence					
4.4.4 Communication, participation and consultation					
4.4.5 Asset management system documentation					

ISO

*Say what you do,
Do what you say,
Prove it,
Improve it!*

If a company isn't effectively meeting customer expectations and isn't achieving its other business goals and objectives, then saying what it does and doing what it says is irrelevant!

Plan-Do-Check-Act (PDCA) Methodology

Plan - establish the asset management strategy, objectives and plans necessary to deliver result in accordance with the organizations asset management policy and the organizational strategic plan.

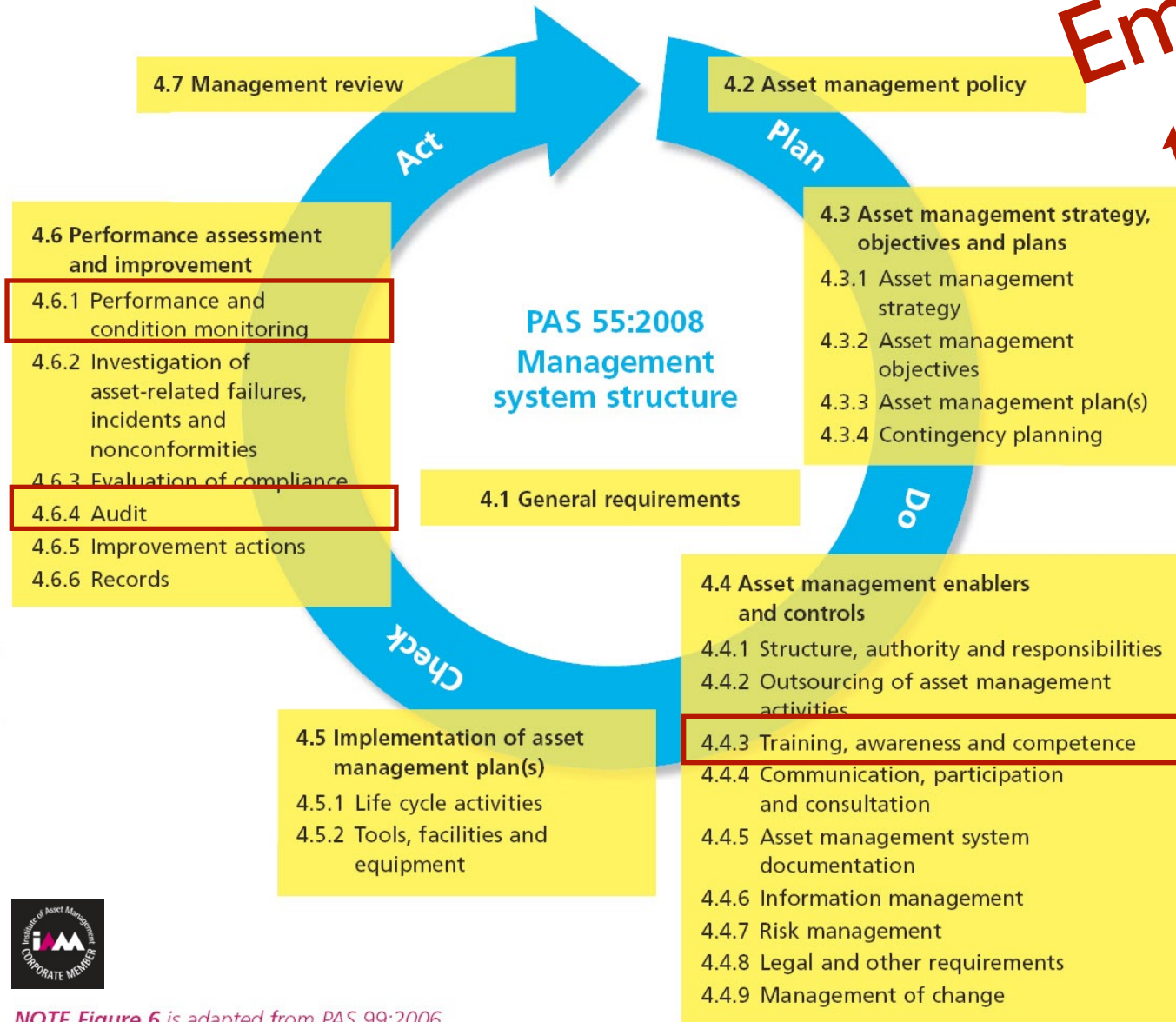
Do - establish the enablers for implementing asset management (e.g. asset information management system(s) and other necessary requirements (e.g. legal requirements) and implement the asset management system

Check - monitor and measure results against asset management policy, strategy objectives, legal and other requirements; record and report results

Act - take actions to ensure that the asset management objectives are achieved and to continually improve the asset management system and asset management performance.

28 Defined Elements

Emphasis today :



The ISO 55000 draft standard was based on these 28 elements and checklist from the BSi PAS 55 standard.



NOTE Figure 6 is adapted from PAS 99:2006.



ISO 18436 Condition Monitoring

ISO- 18436-1: 2012 - Condition monitoring and diagnostics of machines -- Requirements for qualification and assessment of personnel -- Part 1: Requirements for assessment bodies and the assessment process

ISO 18436-2: 2003 - Condition monitoring and diagnostics of machines -- Requirements for training and certification of personnel -- Part 2: Vibration condition monitoring and diagnostics

ISO 18436-3: 2012 - Condition monitoring and diagnostics of machines -- Requirements for qualification and assessment of personnel -- Part 3: Requirements for training bodies and the training process

ISO 18436-4: 2008 - Condition monitoring and diagnostics of machines -- Requirements for qualification and assessment of personnel -- Part 4: Field lubricant analysis

ISO 18436-5: 2012 - Condition monitoring and diagnostics of machines -- Requirements for qualification and assessment of personnel -- Part 5: Lubricant laboratory technician/analyst

ISO 18436-6: 2008 - Condition monitoring and diagnostics of machines -- Requirements for qualification and assessment of personnel -- Part 6: Acoustic emission

ISO 18436-7: 2008 - Condition monitoring and diagnostics of machines -- Requirements for qualification and assessment of personnel -- Part 7: Thermography

ISO- 18436-8: 2012 - Condition monitoring and diagnostics of machines -- Requirements for qualification and assessment of personnel -- Part 8: Ultrasound

ISO 18436 Lubricant Related Standards

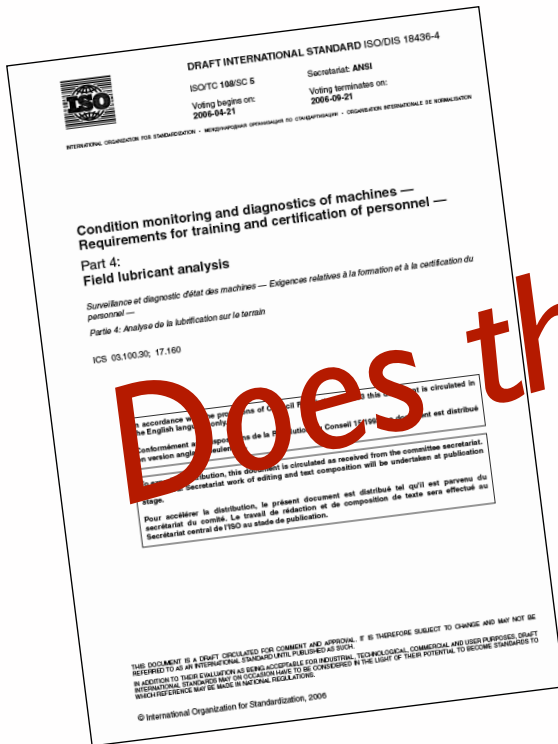
ISO 18436-1 : 2012 specifies *requirements for persons and organizations* ("assessment body") operating conformity assessment systems for personnel who *perform machinery condition monitoring, identify machine faults, and recommend corrective action*. Procedures for the conformity assessment of condition monitoring and diagnostic personnel are specified.

ISO 18436-3 : 2012 defines the *requirements for bodies operating training programs* for personnel who perform *machinery condition monitoring, identify machine faults, and recommend corrective action*. Procedures for training of condition monitoring and diagnostics personnel are specified.

ISO 18436-4 : 2008 specifies the *requirements for qualification and assessment of personnel* who perform *machinery condition monitoring and diagnostics using field lubricant analysis*. A certificate or declaration of conformity to ISO 18436-4:2008 will provide recognition of the qualifications and competence of individuals to perform field lubricant analysis for machinery condition monitoring.

ISO 18436-5 : 2012 specifies the *requirements for qualification and assessment of personnel* who *perform machinery condition monitoring and diagnostics using laboratory-based lubricant analysis*. A certificate or declaration of conformity to ISO 18436-5:2012 provides recognition of the qualifications and competence of individuals to perform laboratory-based lubricant analysis for machinery condition monitoring. It is possible that this procedure is not applicable to specialized equipment or other specific situations.

STLE - OMA



4.2 Category I
Individuals certified as Category I shall be qualified to perform simple tasks related to the proper lubrication of machinery. Personnel classified as Category I shall:

- a) dispense lubricant
- b) prepare lubricant
- c) install lubricant
- d) verify lubricant
- e) operate lubricant
- f) down lubricant
- g) ...
- h) ...
- i) ...
- j) ...
- k) ...
- l) ...
- m) ...
- n) ...
- o) ...
- p) ...
- q) ...
- r) ...
- s) ...
- t) ...
- u) ...
- v) ...
- w) ...
- x) ...
- y) ...
- z) ...

4.3 Category II
Individuals certified as Category II are qualified to perform simple tasks related to recognized procedures. Personnel classified as Category II shall:

- a) set up instruments for basic
- b) perform basic

4.4 Category III
Individuals certified as Category III are qualified to perform and/or direct all types of lubricant analysis. Personnel certified as Category III require all the knowledge and skills expected of personnel certified as Category II and shall also be qualified to:

- a) interpret
- b) select
- c) specify
- d) ...
- e) ...
- f) ...
- g) ...
- h) ...
- i) ...
- j) ...
- k) ...
- l) ...
- m) ...
- n) ...
- o) ...
- p) ...
- q) ...
- r) ...
- s) ...
- t) ...
- u) ...
- v) ...
- w) ...
- x) ...
- y) ...
- z) ...

Training requirements and minimum training hours for field lubricant analysis personnel

Subject	Category I	Category II	Category III
1. Maintenance Strategies			
2. Lubrication Theory/Fundamentals	2.5		
3. Lubricant Selection		1	
4. Lubricant Application	4		
5. Lubricant Storage and Management	2.5	1	-
6. Lubricant Contamination Measurement and Control	4	-	6.5
7. Oil Sampling	2.5	-	-
8. Lubricant Health Monitoring, Diagnostics, Prognostics & Generic Maintenance Recommendations	2.5	6	-
9. Wear Debris Monitoring and Analysis	2.5	7	-
10. Lubricant Analysis Program Development and Management	1	5	8
Total hours for each Category	-	4	8
	24	-	11.5
		24	6
			32



OMA 1 -STLE Website Info



OMA I:

The STLE Oil Monitoring Analyst Certification has been redefined and testing updated to **more closely reflect** the International Standard ISO 18436-4. STLE OMA I reflects the testing requirements stated in ISO 18436-4 Category II and STLE OMA II reflects the testing requirements stated in ISO 18436-4 Category III.

The Oil Monitoring Analyst I (OMA I) exam is designed to test and document the knowledge of an individual who conducts first echelon oil monitoring and analysis, as it applies to lubrication analysis and machine condition monitoring. The emphasis of this exam is the routine operation of an oil analysis program.

3 Levels - Category 1, 2, 3

5.3.3 Mature candidate entry

Mature candidates seeking Category II certification, with at least 5 years documented experience without significant interruption (see definitions) in lubricant analysis based condition monitoring of machines for which certification is sought, may not need to have been previously certified to Category I. Candidates must provide evidence of completion of an equivalent Category I course of training (covering the syllabus contained at Annex A) that was of at least the duration specified in Table 1. Such candidates should apply to the certifying body under the mature candidate route. If a significant interruption in continuity in the application of field lubricant analysis based condition monitoring exists, the candidate may be required to undertake further training as determined by the certifying body.

ISO 5500 Training, Awareness, and Competence

4.4.3 Training, awareness and competence

The organization shall ensure that any person(s) under its direct control undertaking asset management related activities has an appropriate level of competence in terms of education, training or experience.

NOTE Levels of appropriate asset management competence can be ascertained through the use of a competency requirements framework (see Bibliography for examples of relevant competency requirements frameworks).

Where asset management activities are outsourced, the organization shall ensure that contracted service providers have arrangements in place to ascertain and demonstrate that their staff are competent.

The organization shall develop plans for the human resources required to develop and implement its asset management system. The organization shall identify the competency requirements for these human resources and plan the training necessary for them to achieve these competencies. It shall arrange for provision of this training and retain associated records.

The organization shall establish, implement and maintain process(es) and/or procedure(s) to make persons working under its control aware of:

- a) the asset management related risks associated with their work activities and the asset management benefits of personal performance;
- b) their roles and responsibilities and the importance in complying with the asset management policy, process(es) and/or procedure(s) and plan(s);
- c) the potential consequences of departure from specified asset management process(es) and/or procedure(s).

The organization shall ensure that any person(s) under its direct control undertaking asset management related activities has an appropriate level of competence in terms of education, training or experience.

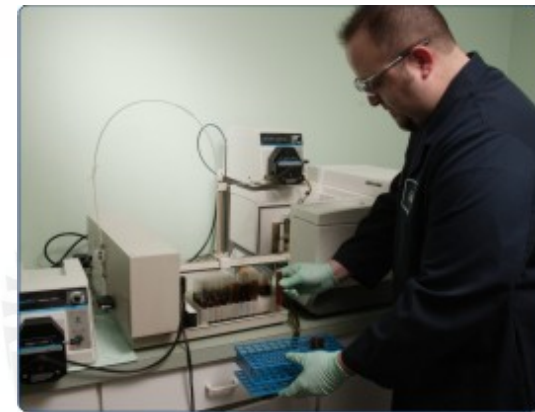
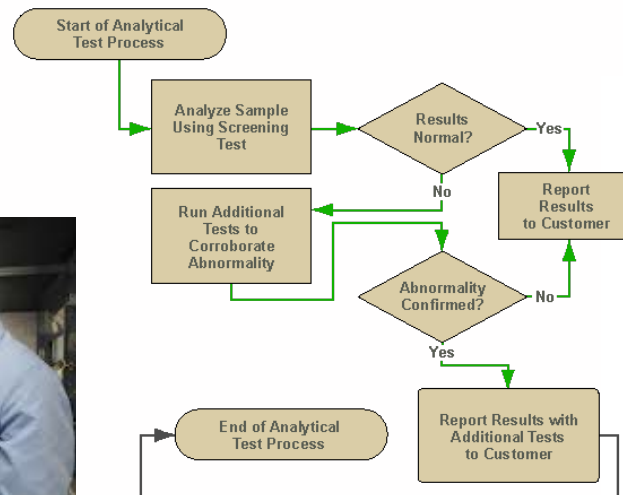
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Laboratory

ISO/IEC 17025 : 2005 specifies the general requirements for the **competence to carry out tests and/or calibrations, including sampling.** It covers testing and calibration performed using standard methods, non-standard methods, and laboratory-developed methods.



On-Site testing ?

Performance and Condition Monitoring

4.6.1 Performance and condition monitoring

The organization shall establish, implement and maintain process(es) and/or procedure(s) to monitor and measure the performance of the asset management system and the performance and/or condition of assets and/or asset systems. The process(es) and/or procedure(s) shall provide for the consideration of:

- a) reactive monitoring to identify past or existing nonconformities in the asset management system, and any asset-related deterioration, failures or incidents;
- b) proactive monitoring to seek assurance that the asset management system and assets and/or asset systems are operating as intended. This shall include monitoring to ascertain that the asset management policy, strategy and objectives are met, the asset management plan(s) are implemented, and that the process(es), procedure(s) or other arrangements to control asset life cycle activities are effective;
- c) leading performance indicators to provide warning of potential non-compliance with the performance requirements of the asset management system and/or the assets and/or asset systems;
- d) lagging performance indicators to enable detection of, and to provide data about, incidents and failures of the asset management system, and for incidents, failures or deficient performance of assets and/or asset systems;
- e) both qualitative and quantitative measures, appropriate to the needs of the organization;
- f) monitoring the overall effectiveness and efficiency of the asset management system;
- g) recording of monitoring and measurement data and results to facilitate subsequent analysis of problem causes to assist in determining corrective or preventive actions and/or to facilitate continual improvement (in accordance with 4.6.5).

When setting the frequency of condition or performance monitoring and the parameters for measurement the organization shall consider, at a minimum, the costs of monitoring, the risks of failure or nonconformity, and potential deterioration mechanisms and deterioration rates.

The organization shall establish, implement and maintain process(es) and/or procedure(s) to monitor and measure the performance of the asset management system and the performance and/or condition of assets and/or asset systems. The process(es) and/or procedure(s) shall provide for the consideration of:

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- c) leading performance indicators to provide warning of potential non-compliance with the performance requirements of the asset management system and/or the assets and/or asset systems;



Audit(s)

4.6.4 Audit

The organization shall ensure that audits of the asset management system are conducted to:

- a) determine whether the asset management system:
 - i) conforms to planned arrangements for asset management, including the requirements of Clause 4.

b) The audit should include assessing and determining the viability and suitability of the asset management policy, strategy, objectives and plans, particularly in relation to critical assets and...

i) The auditor should be aware that the existence of an asset management policy, strategy, objectives, targets and plans alone are no guarantee that they are (or will be) effective in the optimal management of the assets. Therefore, the auditor should seek further evidence to validate the effectiveness of the asset management system.

The selection of auditors and the conduct of audits shall ensure objectivity and the impartiality of the audit process. Audits shall be conducted by personnel independent of those having direct responsibility for the activity being examined.

NOTE 1 The term "independent" here does not necessarily mean external to the organization.

NOTE 2 It is recommended that the selection of auditors considers their level of understanding of good practice in asset management and familiarity with the requirements of **Clause 4** of this PAS.

competencies);

- availability/allocation of time (including timing interdependencies).



Kev's Speculation

The family of standards will align with, and be capable of integrating with, other major management systems specifications. These include ISO 9001 for quality management, ISO 14001 for environmental management, OHSAS 18000 for occupational health and safety, and ISO 31000 for risk management.

ISO 9000

Companies that have ISO 9000 series will be “forced” to implement ISO 55000

ISO 55000

“Forced” implementation will be driven by: Shareholders, Customers, Production Loss Insurance and **\$\$\$\$**

ISO 18436

ISO 18436 - Part 4 and 5 ...will become the standard for the qualification and competencies of individuals performing lubricant related monitoring activities.

Questions ?



*It is not the strongest of the species to survive,
nor the most intelligent,
but the one most responsive to change.*

Charles Darwin (1809-1882)

